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AFFIDAVIT ON OBVIOUSNESS 37 C.F.R. 1.132

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	James M. McClelland, Jr. Glenn E. Hoffman	Art Unit:	1742
Serial No.:	09/852,866	Examiner:	Andrews, Melvyn J.
Filed:	May 10, 2001		
Title:	METHOD OF PRODUCING A METALLIZED BRIQUETTE		

AFFIDAVIT UNDER 37 C.F.R. 1.132

I, JAMES M. McCLELLAND, JR., do hereby depose and say, that:

I am a co-inventor and a co-applicant of the *METHOD OF PRODUCING A METALLIZED BRIQUETTE*, patent application Serial No. 09/852,866 filed May 10, 2001, and that I am familiar with the contents of the patent application, that I am familiar with the Examiner's Office Action dated July 30, 2002 in the above-identified United States patent application, in which Examiner ANDREWS rejected the claims in the above application on that patent, and that I am aware of the prior art cited by the Examiner, and that it is clear that the present invention is not obvious for the following reasons:

The briquette that is described in the application is compounded and processed so that not only is it suitable for handling so that it can be placed in a furnace without spalling or otherwise fragmenting, but it is also suitable for layering on a hearth furnace. In the furnace the briquette metallizes to greater than 90% metal by a process of Direct Reduction. Following metallization, while still hot, the briquette is then removed for either collection or further processing in an EAF furnace. The briquette not only has to possess good drop test properties as a green briquette, but following Direct Reduction in the furnace, the briquette must possess adequate crush strength that it can be conveyed to the next stage without breaking apart.

In contrast to Crowe (US 2,865,731), the briquette of the invention is formed using

conventional briquetting equipment which generates pressures around 17,000 psi, well in excess of the 5000 psi cited by Crowe in col. 2, line 51. Another important distinction is that the green briquette contains less than 5% (target 1%) water, and I have requested that the claims be amended to reflect this upper limit. Crowe's invention calls for a moisture content of around 14.8 % (col 2, line 46). Crowe requires a briquette that is pre-dried (tumble dried – col. 3, line 42) prior to being loaded into an iron making furnace. With our process, the moisture is so low that even when the briquette is essentially instantly heated to greater than 1000 °C, there is not sufficient pressure within from the formed water vapor to break the briquette apart. The briquette is compounded with sufficient reductant that the stoichiometry produces DRI. There is enough carbon to convert the iron oxide to iron. The lower amount of water reduces the energy required to dissipate the moisture, and the less moisture the less reductant or DRI gases needed to convert water into carbon monoxide and hydrogen.

Another difference between the prior art and the present invention is the effect of the reductant on the cellulosic fiber. Cellulosic fibers and acrylonitrile fibers can be converted by pyrolysis to carbon fibers. Acrylonitrile fibers form a carbon fiber known as PAN. During metallization the briquettes attain temperatures that are comparable to the pyrolysis temperatures used to produce carbon fibers (a.k.a. graphite polymers), and a reasonable explanation for the formation of a metallized briquette exhibiting higher crush strength than traditional binders, as shown in Figure 2 of the specification, is that the cellulosic fibers are converted into carbon fibers. Possibly Avotins et al. (US 5,464,465) use of acrylonitrile fibers, which as previously noted are the starting material for PAN carbon fibers, is another example of this conversion. However, Avotins does not use a reductant like coke and does not disclose the properties of the metallized briquette, so one can only speculate about what results might be achieved.

Our work has led us to discover that not only are cellulosic fibers, like paper fibers, useful binders, but also other fibers, even including scrap cellulosic fibers, like scrap from cotton gins, sugar cane and even municipal waste, are suitable binders. This is especially useful when the cellulose fibers are combined with a reductant. Municipal waste may seem like a very unlikely source for a binder, but the dried material is loaded with cellulosic fibers, and has a lower oxygen percentage than cellulose fibers like paper, and therefore these scrap materials are also a potential source as a partial

replacement for the reductant. Scrap streams have no costs, except for the cost of handling, and are a way of utilizing a waste stream to generate iron less expensively, and also eliminate the scrap improving the environment. The iron in the briquette can serve an additional purpose, in that small quantities of toxic metals will be encapsulated in the briquette and therefore these toxic metals are removed from the environment.

In summary, I have read the cited patents, and as one who has 23 years of experience in this field, it is my opinion that the invention is not obvious. As stated at the beginning of my affidavit, the formation of a briquette using high pressures, where the briquette is compounded with minimal quantities of water and stoichiometric amounts of reductant, produces a green briquette with good drop resistance and, following DRI, a metallized briquette having crush strength that is superior to conventional binder systems, at a fraction of the cost. This process is not disclosed in the cited patents. I would be pleased to provide you with samples showing comparative results as I realize that it is difficult to get a handle on the totality of the incremental effects of this process. I request that you please reconsider your rejection in light of my Affidavit.

Respectfully,

J. M. N.

(Affiant / Inventor)

Sworn to and subscribed before me this 7TH day of ~~September~~ October, 2002.

Kathleen Bucky

Notary Public

(Seal / Stamp)

My Commission Expires June 4, 2006